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ABSTRACT

The feasibility and sustainability of a distance learning program at the Texas Transportation Institute, which is part of the Texas A&M University system, was investigated. A literature review and online survey of current transportation professionals were conducted to examine the market potential for a distance learning program and to identify those engineering topics that are in high demand within various transportation organizations. The survey was publicized via e-mail announcements that were sent to professional societies and organizations within the transportation community. Of the approximately 1,500 recipients of the announcement, 209 completed the survey. Most respondents had an overall good perception of continuing education opportunities within the field of transportation. Although the respondents expressed a slight preference for online course techniques, they also expressed significant levels of interest in interactive video-based and CD-ROM-based courses. Most respondents indicated a desire to participate in distance learning courses once or twice a year. Courses in traffic engineering, modeling/simulation, and intelligent traffic systems were rated as top three types of courses most urgently needed. Although awareness of distance learning opportunities was high, relatively few respondents or their coworkers had participated in such opportunities. (The bibliography lists 7 references. The questionnaire and raw results are appended.) (MN)

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ED 452 431

AN ANALYSIS OF THE MARKET POTENTIAL FOR DISTANCE LEARNING OPPORTUNITIES IN TRANSPORTATION PROFESSIONAL DEVELOPMENT

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ABSTRACT

One in seven jobs in the United States is related to the transportation industry and qualified employees are in high demand for these positions. The increased use of advanced technologies in transportation has created a dilemma for transportation professionals. This dilemma is to find employees capable of working within this new technology influenced arena. Furthermore, the skills required of the transportation workforce are constantly changing and becoming more complex and diverse. Thus, there is also a need to enhance the knowledge, skills, and abilities (KSAs) of current transportation professionals. Distance learning is an attractive means of enhancing KSAs because students are provided with the opportunity of anytime, anywhere learning. Additionally, the potential audience for distance learning courses is not limited to a specific region.

This research investigated the feasibility and sustainability of a distance learning program at the Texas Transportation Institute through the Center for Professional Development. Through a literature review and an on-line questionnaire, the research examined the market potential for a distance learning program, including those engineering topics that are in high demand within various transportation organizations. Some other issues that the research addressed included an individual's willingness to pay for courses, potential frequency of participation, and preferred course delivery medium. The results yielded a determination of the feasibility and sustainability of such a program and a prioritized list of topics that will provide direction in the initiation of a transportation-related distance learning program.

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EXECUTIVE SUMMARY

One in seven jobs in the United States is related to the transportation industry and qualified employees are in high demand for these positions. The increased use of advanced technologies in transportation has created a dilemma for transportation professionals. This dilemma is to find employees capable of working within this new technology influenced arena. Furthermore, the skills required of the transportation workforce are constantly changing and becoming more complex and diverse. Distance learning is an attractive means of enhancing the knowledge, skills, and abilities (KSAs) because students are provided with the opportunity of anytime, anywhere learning.

Through a literature review and an on-line questionnaire, completed by current transportation professionals, the market potential for a distance learning program was examined. Some issues addressed by the questionnaire included an individual's willingness to pay for courses, potential frequency of participation, course topics, and preferred course delivery medium.

The examination of the questionnaire responses indicated that respondents have an overall good perception of the need for continuing education in the transportation field, and that the establishment of a distance learning program is a viable means of presenting these courses. The respondents were asked to select from a list of 15 possible topics of interest for continuing education courses. They were allowed to select as many responses as they felt were appropriate and were also given "other" as an option with space to further clarify this response. The analysis of these responses indicated that there

is a diverse field of interest within the transportation community for continuing education. However, the most desired topic was traffic engineering, followed closely by modeling/simulation and intelligent transportation system (ITS) courses.

A critical topic in the consideration of feasibility and sustainability for a program is the fee that a participant is willing to pay for a distance learning course. The preferred fees given for distance learning courses tend to be lower than those currently found for conventional continuing education courses. A further analysis of course fees is important to ensure sustainability of the distance learning program. The next step in the establishment of a distance learning program is to develop a pilot course that meets one of the needs expressed by the transportation professionals. This pilot course would be tested for usability and appeal to the target market.

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I. INTRODUCTION

In today's world of rapidly changing technology and escalating competition, employers are finding it increasingly difficult to keep their workforces technologically current and well trained. Furthermore, time, distance, travel costs, and other constraints on workers have made traditional approaches to training more difficult. By using technology such as computers and telecommunications, knowledge experts can use innovative approaches to deliver training and education to those who need or desire it. These new approaches include "just in time" delivery of critical information where and when it is needed, at the appropriate and desired level of detail, and in a format preferred by the user. Avoiding excessive and extraneous information ensures that the education workload for the user is manageable and meaningful. One of the approaches for this type of learning environment is termed distance learning.

Research Objectives

The purpose of this research was to investigate the feasibility and potential sustainability of developing a distance learning program at the Texas Transportation Institute (TTI) through the Center for Professional Development (CPD). The research identified the potential market for distance learning opportunities provided by the Center to transportation professionals, both within the Southwest Region University Transportation Center (SWUTC) region and nationwide. The research also identified

those transportation-related topics that are critically needed by that market and will most likely generate interest and support for a distance learning program.

II. LITERATURE REVIEW

Quite simply, distance learning is any type of education that occurs when location, time, or both separate the participants. In distance learning, the teacher, through the use of technology, delivers instruction to a student at a separate location. The teacher then receives feedback, either immediate or delayed, from the student. Contrary to popular opinion, distance learning does not have to be "high tech." A classic correspondence course in which printed materials are mailed to the student and returned to the teacher is distance learning. In fact this method, which utilizes the postal system, was the original form of distance learning. Distance learning may utilize any individual or combination of the following four technologies:

- Printed materials;
- Audio/Voice technologies;
- Computer technologies; and
- Video technologies

Types Of Distance Learning

Distance learning may be roughly divided into two delivery types - synchronous and asynchronous. Synchronous learning implies that the student and trainer interact with each other in real time, while asynchronous learning relies on delayed feedback. Distance learning that utilizes printed materials exclusively is always asynchronous,

although utilization of faxes or electronic mail minimizes the delay between interactions. Audio, computer, and video technologies may be used for either synchronous or asynchronous distance learning. Table 1 outlines synchronous and asynchronous delivery methods of distance learning utilizing various technologies.

Table 1. Examples of Synchronous and Asynchronous Delivery.

Technology	Synchronous	Asynchronous
Printed Material	None	Self Paced Textbooks Correspondence Course
Audio/Voice	Audio conferencing Telephone	Audiotape Radio
Computer	Chatroom Desktop video conference	E-mail CD-ROM Bulletin Board
Video	Video conferencing	Videotape Television Broadcast

III. STUDY DESIGN

The intent of this study was to determine the professional development needs, with regard to distance learning, of current professionals in the arena of transportation. The study team determined that an on-line questionnaire would be an effective method for gathering input from the target audience. An initial study questionnaire was distributed during the 2000 TransLink® Partners Meeting to receive feedback and to ensure that the study was gathering the appropriate information for analysis and decision making by the researchers. A copy of this initial questionnaire was also given to the external project advisor. The intent was to receive her input regarding essential questions and format based on her expertise in the continuing education field.

Based on the feedback received from these two sources, the study team refined the questionnaire and made it available on-line through the TTI website to gather information from professionals nationwide. The study targeted professionals within all interest areas and career paths of transportation. Team members sent messages to professional societies and organizations within the transportation community via email to encourage them to complete the questionnaire. The original messages were sent to 11 different listserv groups with approximately 1500 recipients total. A copy of the on-line questionnaire is located in the Appendix A. Also included in Appendix A are the definitions given for certain key terms within the questionnaire.

Study responses were collected over a three month period to allow adequate time for participation. Once the participant had completed the on-line questionnaire, the data

was automatically stored in a database. Electronic safeguards were put into place so that a person could not complete the questionnaire more than once. Also, the responses were stored such that all identifying information was removed, and the responses were completely anonymous.

The study team analyzed the collected data to identify the general needs of the audience with regards to professional development and distance learning. Information was gathered regarding familiarity with continuing education and distance learning, topics of interest to the transportation community, and demographic information such as employment and computer availability and usage.

IV. RESULTS

The on-line questionnaire collected 209 responses, during the three month period that it was available. This response rate constitutes approximately 14 percent of the original message recipients, which is considered acceptable for the blind questionnaire format. The raw results for this study can be found in Appendix B.

The volunteers who participated were primarily full-time employees within the transportation profession. Table 2 provides a breakdown of the types of organizations where the participants were employed. Also, it should be noted that the participants in this study were distributed almost equally among experience levels from less than 5 years to greater than 20 years of experience.

Table 2. Type of Organization Where Study Participants are Employed.

Organization	Number of Participants	Percentage (%)
Consultant	61	29
Educational Institution	41	20
Municipal Department of Transportation	29	13
State Department of Transportation	23	11
County Department of Transportation	10	5
Research Establishment	10	5
Metropolitan Planning Organization	9	4
Federal Agency	6	4
Systems Integrator	3	1
Automotive Manufacturer	3	1
Vendor	2	1
Public Transit Agency	2	1
Other	10	5

Another area of interest to the researchers was the availability of computers and the Internet to transportation professionals. Questions were asked regarding both home and work computer access. Responses indicated that all of the participants have computers at work, and 91 percent have computers at home. The majority of those with available computers have access to the Internet (99% at work and 96% at home). However, these results are most likely biased as the questionnaire was distributed and completed electronically. Despite this recognized bias, the fact that computers are readily available to individuals within the transportation profession creates a viable conduit for the exchange of information during the process of distance learning. Further information regarding these computer systems is that the majority of them are PC based systems (98 percent at work, 94 percent at home), and have a CD-ROM as a component of this system (95 percent at work, 97 percent at home). These features are important to consider when determining delivery methods that could be employed for distance learning.

General Continuing Education

In response to the questions regarding continuing education within the participant's organizations, 96 percent responded that either they, or someone in their organization, had taken a continuing education course. It was the perception of the participants in this study that continuing education courses are beneficial to employees within their organizations in many ways. The most frequently cited benefit in this study was increased responsibility within the organization.

The responses indicated that 96 percent of the organizations employing the study participants give some form of support for continuing education. Financial reimbursement, or financial reimbursement and leave, are the most common ways that an employer encourages participation in continuing education. This support by the employer is a major factor in a person's ability to participate in these courses.

The participants' desire to take part in continuing education opportunities can be seen in their ranking of need for continuing education as high or medium, indicating that they believe it would benefit them in their future work, or that it was mandated for graduation or employment. However, sending a large number of employees to a training course at a location is often not feasible due to the limited amount of travel funds available for this purpose. To make continuing education opportunities readily available to employees, these courses need to be made available in-house. Currently, less than 50 percent of the employers in this study provide in-house continuing education opportunities to their employees on a regular basis. This indicates that other formats beyond the traditional classroom format should be investigated to expand the learning opportunities available to transportation professionals.

General Distance Learning

Familiarity with the concept of distance learning was fairly high among the participants in this study (88 percent), but only a small percentage of the participants knew employees within their organization participating in such courses (35 percent).

The viability of a distance learning program as a continuing education opportunity within the transportation community can best be indicated based on the importance of the conventional classroom format to individuals within this profession. In this study, the majority of the participants (84 percent) said that a conventional classroom format was only somewhat important or not important to them in continuing education. Only 16 percent of participants thought that it was very important to participate within a conventional classroom situation. Based on these results, it would appear that the use of distance learning techniques would be well accepted by the target audience, the transportation profession.

Further questions investigated the frequency with which the respondents would like to participate in distance learning opportunities. In response to this, the majority of the participants (75 percent) stated that they would be interested in participating once or twice a year, with only seven percent indicated that they would never be interested in such courses.

One of the key points for this study was to determine the preferred method of participation for distance learning within the transportation profession. Table 3 contains the responses to this question. In the responses, the rankings were given as 1 being the favorite option and 4 being the least favorite option. The "Ranking Sum" was calculated by summing the rankings given for each option. Using this method, the preferred option in the table would have the lowest "Ranking Sum".

Table 3. Preferred Method for Distance Learning Participation

Ranking	Participation Options		
	Interactive Video	On-line Courses	CD-ROM Courses
1 (Favorite)	20	39	20
2	51	63	68
3	56	39	46
4 (Least Favorite)	27	14	24
0 (Not Sure)	54	53	50
Ranking Sum	398	338	390

On-line courses received the overall best ranking for preferred method of participation. However, both interactive video and CD-ROM based courses were also frequently selected and would provide good alternatives when students do not have access to the Internet. The divided responses indicate that all three methods would be well received as possible tools for distance learning courses.

Distance Learning Course Topics

Further aspects of distance learning sustainability that was explored during this study were:

- the need for particular topics in continuing education, and
- the perceived current topic opportunities within the area of transportation.

It was the perception of 71 percent of the study participants that continuing education courses already exist that are specifically tailored to transportation. Some of the examples provided of such courses included: engineering courses, university offered

continuing education, seminars at professional organization meetings, software courses, and many more varied responses. Several people simply stated that too many exist to list.

When taken in conjunction with the results presented earlier, the survey indicates that while there are a large number of opportunities available to transportation professionals, most of the profession is not taking advantage of the opportunities. This raises the question of would distance learning make them more accessible to the profession as a whole?

When the participants were asked to select topics that they believed were of significant need to the transportation community for distance learning opportunities, the most frequent response was traffic engineering courses, followed by modeling/simulation software, and ITS courses. Table 4 lists all of the available topics that were given as options in the survey, and the percentage of participants who selected each individual option. It should be noted, that participants could select more than one topic for this question.

Table 4. Continuing Education Topics Needed in Transportation.

Topic	Percentage of Responses (%)
Traffic Engineering	71%
Modeling / Simulation Software	58%
Intelligent Transportation Systems	54%
Analysis Software	47%
Strategic Planning	36%
Telecommunications	33%
Systems Engineering	32%
Other	29%
Contract Management	27%
Incident Management	25%
Systems Architecture	22%
Environmental Management	20%
Financial Management	20%
Grants Management	17%
Emergency Management	15%

Within the 29 percent of the responses that included "Other," some of the trends regarding additional topics included: human factors in transportation, communication skills (including technical writing, public speaking, etc.), and roadway and structural design courses.

Continuing Education Units (CEUs)

Although most of the study participants were familiar with CEUs, only 15 percent of the employers used them for promotion/salary increase. Forty-two percent stated that CEUs were required for their professional certifications. It is the feeling of the researchers that this percentage will continue to increase as more professional

certifications or employers within the transportation field begin requiring CEUs for continued licensing and/or employment.

CEUs can be a driving force behind the need for continuing education and, more specifically, distance learning. Through distance learning, individuals are able to earn CEUs without having to take leave from work and, in many cases, are also able to complete courses at their own pace and time convenience.

Though it appears that most employers reimburse employees for continuing education costs, fees for the courses are still a major issue in establishing a successful distance learning program. Table 5 shows the breakdown of study participants' opinions about the fees that should be associated with distance learning courses. The number within each box indicates the number of respondents who would pay the given fee for a course of the specified duration. For example, 45 respondents indicated a willingness to pay $500 for a 4 day (3.2 CEU) course.

Table 5. Distance Learning Course Fees

Length of Course (CEUs)	$200	$300	$400	$500	$600	$700	$800	$900	Not Sure
1 day (0.8 CEUs)	102	24	1						82
2 day (1.6 CEUs)		71	50	4					84
3 day (2.4 CEUs)*			10	15	4				23
4 day (3.2 CEUs)				45	44	16			104
5 day (4.0 CEUs)						55	33	14	98

* Partial data was lost due to database error.

Table 5 shows that the preferred fees given in these responses tend to be lower than those currently found for conventional continuing education courses. Traditional courses, with an instructor, cost more to produce and offer than stand-alone, self-paced course. The lower costs associated with distance learning make it feasible to provide these courses at the indicated lower fees, depending on both the nature and delivery method of the course. This may be an incentive to employers in encouraging distance learning as a preferred continuing education opportunity.

Further examination of the survey responses regarding acceptable fees shows that a large number of the respondents answered "not sure". This response could be due to the significant number of employers who are financially supporting employee participation in continuing education courses. As a result of this support, survey respondents may not be fully aware of the cost issues surrounding distance learning opportunities.

V. FINDINGS AND RECOMMENDATIONS

Based on the analysis of the study questionnaire, respondents have an overall good perception of continuing education opportunities within the field of transportation. This positive background bodes well for the feasibility and potential sustainability of a transportation distance learning program at the Texas Transportation Institute. The following points should be considered in the establishment of this program.

1. The preference of the study participants leaned slightly towards the use of on-line course techniques. However, because this format is not accessible for all potential students, and there were close rankings for all three alternatives provided, interactive video or CD-ROM based courses are also potential media for distributing information. One issue that should be further examined is that a large number of the participants selected "Not Sure" when asked what learning format they preferred. The researchers believe that this finding could be attributed to a lack of experience with distance learning formats and that participant feedback during the administration of courses would be necessary to gauge participant opinion as experience increases.

2. The majority of respondents indicated a desire to participate in distance learning courses once or twice a year.

3. While the awareness of distance learning opportunities is high, a relatively low number of respondents indicated that they, or a co-worker, had participated in such opportunities. These results indicate that alternative methodologies and subject material may provide a viable basis for a distance learning program.

4. The most urgent curriculum need, based on participant response, is for traffic engineering courses, followed closely by modeling/simulation courses and ITS courses. However, responses also indicated diverse needs with regard to curriculum in a distance learning program.

The next step in the establishment of a distance learning program is to develop a pilot course that meets a need expressed by the transportation professionals. This pilot course would be tested for usability and appeal to the target market. Furthermore, an in-depth analysis of course fees associated with this effort is important to ensure sustainability of the distance learning program.

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APPENDIX A

QUESTIONNAIRE

Section 1: Distance Learning and Your Organization
(16 questions - approximately 5 minutes)

1) Have you, or any member of your organization, attended or taken a continuing education course?

Yes
No

1a) If *Yes*, what percentage of people in your organization have?

Less than 25 percent
25 to 50 percent
50 to 75 percent
More than 75 percent

2) Does your organization support continuing education?

Yes
No

2a) If *Yes* in what manner does your organization support continuing education?
Please select all that apply - (Hint: Hold down the CTRL key to make multiple selections)

Financial
Reimbursement
Leave
Other

If you answered *Other* in Question 2a above, please list what other types of support they have.

3) In your opinion, do staff in your organization benefit from continuing education?

Yes
No

3a) If *Yes*, how do they benefit?
Please select all that apply - (Hint: Hold down the CTRL key to make multiple selections)

Increased Responsibility
Promotion
Salary Increase
Other

If you answered *Other* in Question 3a above, please list what other benefits they receive.

4) Does your organization currently provide in-house training and development on a regular and continuing basis?

Yes
No
Occasionally

5) Your need to take continuing education is?

High - You need them for graduation and/or your job
Medium - They might benefit you in the future
Low - Would only be for personal interest

6) Are there continuing education courses that are specifically tailored for your field of employment?

Yes
No

If you answered *Yes* in Question 6 above, please list what courses are available.

7) In your organization, what are the topics that you feel are of significant need to you, your staff, or in the transportation community at large?
Please select all that apply - (Hint: Hold down the CTRL key to make multiple selections)

Traffic Engineering
ITS
Systems Engineering
Modeling / Simulation Software
Analysis Software
Telecommunications
Systems Architecture
Environmental Management
Incident Management
Emergency Management
Financial Management
Contract Management
Grants Management
Strategic Planning
Other

If you answered *Other* in Question 7 above, please list what courses you feel are of significant need.

8) In continuing education, how important is it to be part of a conventional class?

Very Important
Somewhat Important
Not Important

9) Are you familiar with Distance Learning?

Yes

No

10) Have you, or any member of your organization, obtained degrees, certification, continuing education, or workforce development via distance learning?

Yes
No

10a) If *Yes*, what percentage of people in your organization have?

Less than 25 percent
25 to 50 percent
50 to 75 percent
More than 75 percent

11) If you were to take a distance learning course, which method would you prefer to use when participating?
Please rank from 1 (favorite) to 4 (least favorite)

a) Interactive Video	1 2 3 4	Not Sure
b) On-line Courses	1 2 3 4	Not Sure
c) CD-ROM Based Courses	1 2 3 4	Not Sure

12) How often would you be interested in participating in a distance learning course regarding transportation continuing education?

Once a year
Twice a year
Three times a year
Four to six times a year
More than six times per year
Never

13) Are you familiar with Continuing Education Units (CEUs)

Yes
No

14) Does your company use CEUs for promotional/salary increase purposes?

Yes
No

15) Are you required to obtain CEUs to maintain a professional certification?

Yes
No

16) What do you consider a reasonable fee for a course offered via distance learning? *(remember, 1 CEU is equivalent to 10 PDHs)*

a) 1-day course (0.8 CEUs)	$200 $300 $400	Not Sure
b) 2-day course (1.6 CEUs)	$300 $400 $500	Not Sure
c) 3-day course (2.4CEUs)	$400 $500 $600	Not Sure
d) 4-day course (3.2 CEUs)	$500 $600 $700	Not Sure
d) 5-day course (4.0 CEUs)	$700 $800 $900	Not Sure

Section 2: Demographic Information
(7 questions - approximately 3 minutes)

---

17) What is your highest level of education?

High School
Associate Degree / Technical (Vocational) Education
Bachelor's Degree
Master's Degree
Doctoral Degree
Other / Decline to answer

18) What is your employment status?

Full-time
Part-time
Student
Retired
Other / Decline to answer

19) How many years of transportation-related experience do you have?

Less than 5 years
5-10 years
10-15 years
15-20 years
More than 20 years

20) What type of organization do you work for?

State Department of Transportation
Municipal Transportation Department
County Transportation Department
Metropolitan Planning Organization
Consultant
Federal Agency
Toll Road Authority
Public Transit Agency
Law Enforcement
Systems Integrator
Educational Institution
Research Establishment
Automotive Manufacturer
Vendor
Other

If you answered *Other* in Question 20 above, please list what type of organization you work for.

21) In which state/province do you work??

Select State/Province

22) What is your position with your organization?

23) What professional certifications you you have?
Please select all that apply - (Hint: Hold down the CTRL key to make multiple selections)

Professional Engineer
Professional Traffic Operations Engineer
Project Manager
Professional Engineer-In-Training
None
Other

If you answered *Other* in Question 23 above, please list what certifications you hold.

Section 3: Your Available Computer Technology
(10 questions - approximately 4 minutes)

24) Do you have access to a computer at work?
If the answer is "No", please go to Question 28

Yes
No

25) Does your computer at work have Internet access?

Yes
No

25a) How do you connect to the Internet at work?

Dial-up modem
ISDN (Integrated Digital Subscriber Network)
DSL (Digital Subscriber Line)
Cable Modem
Corporate LAN
I'm Not Sure

26) Does your computer at work have a CD-ROM?

Yes
No

27) What type of computer do you have at work?

PC
Mac
Other/Not Sure

28) On what platform does your computer at work operate?

Windows 95/98
Windows NT/2000
Apple Macintosh System 6 or higher
Sun Solaris
Linux
Other / Don't Know

29) Do you have access to a computer at home?
If the answer is "No", please go to the end of the survey

Yes
No

30) Does your computer at home have Internet access?

Yes
No

30a) How do you connect to the Internet at home?

Dial-up modem
ISDN (Integrated Digital Subscriber Network)
DSL (Digital Subscriber Line)
Cable Modem
I'm Not Sure

31) Does your computer at home have a CD-ROM?

Yes
No

32) What type of computer do you have at home?

PC
Mac
Other/Not Sure

33) On what platform does your computer at home operate?

Windows 95/98
Windows NT/2000
Apple Macintosh System 6 or higher
Sun Solaris
Linux
Other / Don't Know

APPENDIX B

RAW RESULTS

Q1:

Responses	Number	Percentage (%)
Yes	200	96
No	9	4

Q1a:

Responses	Number	Percentage (%)
< 25%	98	47
25 – 50%	47	22
50 – 75%	33	16
> 75%	31	15

Q2:

Responses	Number	Percentage (%)
Yes	201	96
No	8	4

Q2a:

Responses	Number	Percentage (%)
Financial (F)	70	35
Leave (L)	8	4
Other (O)	6	3
F,L,O	18	9
F,L	87	43
F,O	8	4
L,O	2	1
Did Not Respond	2	1

Q2b:

Policy considers certain training CRITICAL.	Travel reimbursement, time to develop courses,
On-site classrooms for live and TV courses	Flexible schedule
Training on company time	Training, Masters program with leave and full pay
We offer CC, but not in transportation	working flex time
whatever it takes	Bring in some types of training
Sponsered Training classes at the workplace.	Provided Extra Training & First Aid Training
40hrs per calender year for outside training available	fellowships, on-site courses (distance learning)
paid working day	Both financial reimbursement or leave
Meets the requirements of an extra PD day	1/2 Financial Reimbursement
Salary Credit	Time and resources for course development
conducts it or arranges it thru contract, etc. for	We plan and present continuing education.
Inhouse Seminars	Educational instruction
Flexible hours to allow attending classes	time off for training taken during the summer
Marketing & Promotions	continuing education credit, university credit,
Development and Delivery	If time (schedules permit), travel $ is available
travel expenses	Paid as work if sancitioned by Dept
provide course for others	

Q3:

Responses	Number	Percentage (%)
Yes	205	98
No	4	2

Q3a:

Responses	Number	Percentage (%)
Increased Responsibility (I)	49	24
Promotion (P)	7	3
Salary Increase (S)	6	3
Other (O)	41	20
I,P,S	57	28
I,P	12	6
I,S	6	3
P,S	3	1
I,P,S,O	0	0
I,P,O	3	1
I,S,O	1	1
P,S,O	2	1
P,O	0	0
S,O	1	1
I,O	13	6
Did Not Respond	4	2

Q3b:

Expands work types that are performed	Increase opportunity for future trainings
Job security	Knowledge
More effective	more responsibility w/ little or no compensation
Motivation and job satisfaction	Increased Skills
Broadens projects that individual can work on.	better able to do their job
Stay up to date with the most recent technology	Increased information which may not help in job
A better understanding of what tools are available	To be informed in new technologies and development
General professional development	Knowledge
greater knowledge, better employee	Professional development (knowledge)
Increased awareness of new technology & legislation	Increased job capability, improved public confidence
Wider range of responsibilities	Improved morale
A more rounded background, personal growth	Self worth
Exposure to new methods, Professional Contacts,	Increased Job knowledge/productivity
New skills	increased knowledge & skills; employee retention
professional development	Broadened perspective, exposure to new ideas
Maintaining proficiency	Personal Achievement
They do their jobs better	Development of Expertise; Improved Performance
increased sense of their own expertise and worth	more knowledgeable so they are more marketable
I was thinking more of personal benefits	inherent benefits of additional education
have more knowledge	Improved skills
Meets C.E.U.'s for professional licensing	Networking
sense of worth - improved morale	Keeping up with industry standard skills / info
Ability to attract/retain clients	Broader knowledge and increased opportunity
Desire to increase knowledge + promotion sometimes	Better at what they do
new knowledge, contacts	Professional satisfaction of doing the job better,
Increased productivity, self-confidence, etc.	Enhanced technical knowledge
Increased Technical Skills	More valuable employee.
Cross train in other transportation areas	Increased skills, but no direct financial benefit
Knowledge	Additional Skills
Greater efficiency	Keep up with changing technology
Retention	Maintaining professional competence and licensure
Increase Productivity and Better Quality of Work	More knowledge and they do better at their jobs.
Increase knowledge	Increased professionalism
Increased competency	Professional development
Able to better do their jobs, and therefore advance	Ability to do current work better
License Req., ability to better serve the client	Knowledge gain
knowledge helps them do their job better	None of above. Just improved knowledge for future
Increases Productivity & Job Satisfaction	self-esteem, positive morale
Increased proficiency, productivity, expertise	Greater expertise, increased knowledge
Increase knowledge - professional development	Networking opportunities with other engineers
Ability to perform at a higher level	

Q4:

Responses	Number	Percentage (%)
Yes	100	48
No	52	25
Occasionally	57	27

Q5:

Responses	Number	Percentage (%)
High	78	38
Medium	105	51
Low	22	11

Q6:

Responses	Number	Percentage (%)
Yes	148	71
No	61	29

Q6a:

Seminars at professional meetings	Computer education, Highway capacity education
Many universities offer cont. edu programs	Many
Various engineering courses	Numerous courses offered by various organizations
Local university courses, conference workshops	Various topics of Civil Engineering provided by ASCE
but we need GASB 34 & benchmark contracting	Traffic engineering, Pavement maintenance
Courses are available from NHI, and TEEX.	management, transportation engineering & safety, construction
none locally - through Northwestern University	computer software application courses
Michigan State University - Civil Engineering	Forecasting, modeling, planning, design, construction
management, traffic engineering, software application	traffic signal design and maintenance, road surface
Transpeed, TransNow, Inst for Transp. Studies, GA	Too numerous to list
The DOT provides training seminars and the University	management, technical training
Transportation Engineering - there are dozens of courses	Managing Projects, Transportation related innovations
wide variety of seminars, etc. in traffic/transportation	Extra class for work site supervisor, also employee
Lots of traffic and transportation engineering courses	Courses at the Human Factors and Ergonomics Society
Project management	Consulting; computer skills
Standard Transportation and Traffic Short Courses	Planning and Implementing work Zone Traffic Control, Child Safety
Traffic Institute, software developers, manufacturing	see University of Washington - Transpeed Program
Those already offered by other universities	Traffic Engineering
Computer & Personal development courses	Many: ITE, TRB, NHI, ASCE and other universities
NHS Courses, Northwestern Univ. Traffic Institute	NUMEROUS human factors and computing courses through local universities
too many - traffic engineering course by Northwestern	many Transportation Planning related courses offered by many agencies/organizations/associations
too many to list	not sure
Northwestern offers a series of courses	Too many to name.
Transportation planning and engineering	traffic engineering, project management
There are too many to list.	School Bus Transportation Management; School Bus Transportation Supervision; Public Agency Budgeting and Accounting; Public labor Relations
Consultant Firm Management	Northwestern and Georgia Tech have a full battery of Transportation Related courses, but they are costly to attend
Usually through the state centering around ITS, NT	ITS Professional Capacity Building courses.
The Traffic Engineering Institute via Northwestern	Northwestern Traffic courses, Georgia Tech courses, etc.
from ASCE other professional organizations	not sure
Traffic Operations Classes, Traffic Signal Optimizing	Traffic engineering related
not here, but courses available at Northwestern	Courses from the Northwestern University Center for Public Safety. Traffic Signal Control Workshop and many others.
Traffic & Transportation Engineering have a great	Courses at Michigan State Univ. and at Wayne State Univ.
Northwestern Transportation Institute, ITE, TRB	Transportation Planning/ Traffic Modeling
ITS (Berkeley) offers a range.	GIS users courses to stay up-to-date on the latest software
software-related (operating systems, etc.)	Berkeley has short courses. Also Northwestern? uni
MS in Infrastructure Engineering through U of Minn	All kinds from TEEX, ITE, ASCE, Univ. Neb., Geo. Tech., Northwestern, Univ. Florida, and others
transportation engineering, HCM, Land Development	organizational Design and Development, Management

	Development
several cont ed courses at different universities	CAD
Engineering and transportation related courses	ISU CE Cont Ed program, FHWA NHI courses, Auburn U CE Cont Ed program, TRB seminars, etc.
electronics, computers, power point	Various management, computer, and technical related training is available through out community college.
Technical Update forum Automotive Manufactures	Curriculum Development, ISO9001 Training, Leadership Development
Very general traffic courses - Transpeed here in W	Physical Therapy related courses are provided within the state for continued licensure
Delivery of distance education courses, technology	Education, teaching, subject matter content
Auto skills courses from Gateway Community College	As business technology educator, continuing education courses are offered in many areas within my field.
transportation technical training, ADA accessibility	TRAFFIC MANAGEMENT
Transportation Engineering	a variety of legal CLEs
Local university has traffic engineering courses;	from the Education Service Center Region XII-Waco in-service training
1000s	teaching strategies, legal aspects, specific occupational competencies
Many	FSUTMS courses by FDOT, other modeling/forecasting/planning courses around the country, seminars, etc.
Traffic Engineering-related courses	Northwestern University Center for Public Safety Courses, graduate work in transportation engineering
CAD training, roadway design, traffic design and p	Transportation Related training courses are offered by our Training Division regularly. From design to computer applications
Technical education teaching methods courses; comp	Numerous out of state short courses are offered
Northwestern's Transportation Engineering Courses,	Numerous Automotive Service Ind. Technical Update/
There are many. Some of the short courses	Transportation training thru TXDOT
Wetland courses, Hazwopper, NEPA process	teaching methods
Northwestern University	Traffic Flow theory
Northwestern traffic Institute has excellent program	Some transportation courses (technologist level)
Geopak Training, Computer Science courses	TEEX Engineering Training Course
UTA offers some courses in transportation and civil	only at dist level workshops & pro organ offer workshops
Human Factors, Training development, distance learning	Any courses pertaining to traffic operations/transportation
Traffic Calming, Highway Capacity, Project Management	Too numerous to list
Traffic Engineering related courses	ITE Seminars

Q7:

Responses	Total	Percent
Traffic Engineering	148	71%
ITS	113	54%
Systems Engineering	66	32%
Modeling/Simulation Software	122	58%
Analysis Software	98	47%
Telecommunications	68	33%
Systems Architecture	47	22%
Environmental Management	41	20%
Incident Management	52	25%
Emergency Management	31	15%
Financial Management	42	20%
Contract Management	56	27%
Grants Management	35	17%
Strategic Planning	75	36%
Other	42	29%

Q7a:

Wow! Courses on the role of PEOPLE in the transportation system. This is a HUGE need!	Indiv-directed efficiency increase courses: time, contact, proj. management courses
Use of Internet, communications skills	Hydrology and Hydraulics
Understanding data (Not just analytic software)	Human Factors in Transportation
Transit routing and ops, School Transportation Routing and Ops	Human Factors Engineering
Transit Planning	GIS in Transportation
Technician level Sign Management, maintenance, placement, markings placement, signal construction, street light and high mast operation maintenance.	geometric design, public speaking for hostile audiences
Technical classes in roadway design, structural design, etc.; of particular interest might be classes introducing new technologies and new methods.	Accident Reconstruction, Maintenance & Inspection of ITS and Electrical Equipment, Inspection of Pavement Markings
Sustainable Transportation Alternatives	disability accommodation
Supervisory Skills, Customer Relations, Safety, ADA	DEVELOPMENT PLANNING, ADA
Statistical methods in traffic engineering or transportation planning	Communication, Public Relations Skills, Public Speaking
simulation software system architecture	collision investigation
Instrumentation, Project management, Risk Management	Civil Rights Program Management; Diversity; Accessibility Planning; Environmental Justice;
safety, human factors	Auto Ind. Tech Update
Roadway Design, Hydraulics/Hydrology, SWPPP,	Air Quality Issues and EIS preparation
Roadway design	education (teacher in public HS)
Project Management	Accident investigation
Presentations and Technical writing	NEPA training
Safety; intermodal transportation; public involvement	Pavement preventive maintenance
New transportation technologies	

Q8:

Responses	Number	Percentage (%)
Very Important	34	16
Somewhat Important	123	59
Not Important	52	25

Q9:

Responses	Number	Percentage (%)
Yes	183	88
No	26	12

Q10:

Responses	Number	Percentage (%)
Yes	74	35
No	135	65

Q10a:

Responses	Number	Percentage (%)
Less than 25%	201	97
25 – 50%	5	2
50 – 75%	3	1
More than 75%	0	0

Q11:

Ranking	Interactive Video	On-line Courses	CD-ROM Courses
1 (favorite)	20	39	20
2	51	63	68
3	56	39	46
4 (least favorite)	27	14	24
0 (Not Sure)	54	53	50

Q12:

Responses	Number	Percentage (%)
once	83	40
twice	73	35
three	23	11
four-six	11	5
six+	5	2
Never	14	7

Q13:

Responses	Number	Percentage (%)
Yes	196	94
No	13	6

Q14:

Responses	Number	Percentage (%)
Yes	32	15
No	177	85

Q15:

Responses	Number	Percentage (%)
Yes	88	42
No	121	58

Q16:

Length of Course (CEUs)	$200	$300	$400	$500	$600	$700	$800	$900	Not Sure
1 day (0.8 CEUs)	102	24	1						82
2 day (1.6 CEUs)		71	50	4					84
3 day (2.4 CEUs)			10	15	4				23
4 day (3.2 CEUs)				45	44	16			104
5 day (4.0 CEUs)						55	33	14	98

Q17:

Responses	Number	Percentage (%)
High School	1	1
Associate Degree/Technical (Vocational) Education	6	3
Bachelor's Degree	63	30
Master's Degree	107	51
Doctoral Degree	32	15
Other / Decline to answer	0	0

Q18:

Responses	Number	Percentage (%)
Full-time	202	97
Part-time	3	1
Student	2	1
Retired	2	1
Other / Decline to answer	0	0

Q19:

Responses	Number	Percentage (%)
Less than 5 years	46	22
5-10 years	42	20
10-15 years	34	16
15-20 years	29	14
More than 20 years	58	28

Q20:

Responses	Number	Percentage (%)
Consultant	61	29
Educational Institution	41	20
Municipal Department of Transportation	29	13
State Department of Transportation	23	11
County Department of Transportation	10	5
Research Establishment	10	5
Metropolitan Planning Organization	9	4
Federal Agency	6	4
Systems Integrator	3	1
Automotive Manufacturer	3	1
Vendor	2	1
Public Transit Agency	2	1
Toll Road Authority	0	0
Law Enforcement	0	0
Other	10	5

Q20a: Other Responses -

Province of Nova Scotia
Insurance
City Government
City department with emphasis on plan reviews
State economic development agency
Regional Transportation Agency
Land Association
Traffic Flagging & Certifying Flaggers at Community College
Teacher, but was in the Coast Guard for over 20 years

Q21:

Responses	Number	Percentage (%)
Alaska	1	1
Arizona	4	2
Arkansas	2	1
California	10	5
Colorado	5	2
Connecticut	1	1
Delaware	1	1
District of Columbia	4	2
Florida	7	3
Georgia	2	1
Hawaii	1	1
Illinois	4	2
Indiana	1	0
Iowa	2	1
Kansas	1	1
Kentucky	2	1
Louisiana	2	1
Maryland	3	1
Massachusetts	1	1
Michigan	8	4
Minnesota	7	3
Missouri	3	1
Montana	1	1
Nebraska	1	1
Nevada	5	2
New Jersey	1	1
New Mexico	4	2
New York	5	2
North Carolina	3	1
Ohio	1	1
Oklahoma	5	2
Oregon	4	2
Pennsylvania	4	2
Tennessee	3	1
Texas	56	27
Vermont	2	1
Virginia	13	6
Washington	11	5
West Virginia	1	1
Wisconsin	1	1
British Columbia	1	1
Ontario	1	1
Not applicable / No response	13	6

Q23:

Response	Number	Percentage (%)
Professional Engineer	101	48
Professional Traffic Operations Engineer	16	8
Project Manager Professional	6	3
Engineer In Training	26	12
None	53	25
Other	31	15

Q23a: Other Responses

Certified Planner	Certified Public Manger, American Academeny of CPM
Certified Engineering Technologist	PEng in Canada, EI in Colorado and New Mexico
school administrator; technical center director	C. Eng (UK)
ASE Master	LIcensed Psychol. PA; CFHP (Human Factors)
not transportation related	Professional Traffic Engineer
teaching	Teacher Certification
Technology Education	Associate Ergonomics Professional from BCPE
AICP	Vocational Education
FLAGGER,INSTRUCTOR, WORKSITE TRAF. SUP.WRD PROCESS	IMSA tech cert, CDL
Traffic Control Supervisor	ATSSA
Department of Education Manager's Certificate	Professional Traffic Engineer - California
Oklahoma Teacher Certificate, Vocatinal Business	American Institute of Certified Planners
English for scientific purposes & interested in HE	Licensed in physical therapist assisting
Training Generalist	Math Certification
teaching, administrative, vocational job placement	law degree
Certified Public Manager	Driver Ed teacher and Supervisor, Secondary Admin

Q24:

Responses	Number	Percentage (%)
Yes	209	100
No	0	0

Q25:

Responses	Number	Percentage (%)
Yes	207	99
No	2	1

Q25a:

Responses	Number	Percentage (%)
Dial-up Modem	19	9
ISDN	41	20
DSL	10	5
Cable Modem	5	2
Corporate LAN	102	50
Not Sure	27	13

Q26:

Responses	Number	Percentage (%)
Yes	199	95
No	10	5

Q27:

Responses	Number	Percentage (%)
PC	205	98
Mac	3	1
Other/Not Sure	1	1

Q28:

Responses	Number	Percentage (%)
Windows 95/98	105	50
Windows NT/2000	99	47
Apple Macintosh System 6 or higher	3	1
Sun Solaris	0	0
Linux	1	1
Other/Don't Know	1	1

Q29:

Responses	Number	Percentage (%)
Yes	191	91
No	18	9

Q30:

Responses	Number	Percentage (%)
Yes	183	95
No	9	5

Q30a:

Responses	Number	Percentage (%)
Dial-up Modem	148	77
ISDN	3	2
DSL	12	6
Cable Modem	16	8
Corporate LAN	0	0
Not Sure	2	1

Q31:

Responses	Number	Percentage (%)
Yes	186	97
No	5	3

Q32:

Responses	Number	Percentage (%)
PC	180	94
Mac	11	6
Other/Not Sure	0	0

Q33:

Responses	Number	Percentage (%)
Windows 95/98	161	84
Windows NT/2000	14	7
Apple Macintosh System 6 or higher	11	6
Sun Solaris	0	0
Linux	1	1
Other/Don't Know	2	1

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16. Abstract

One in seven jobs in the United States is related to the transportation industry and qualified employees are in high demand for these positions. The increased use of advanced technologies in transportation and the monumental leaps in the use of technology in all aspects of life has created a dilemma for transportation professionals. This dilemma is to find employees capable of working within this new technology influenced arena. Furthermore, the skills required of the transportation workforce are constantly changing and becoming more complex and diverse. Thus, there is also a need to enhance the knowledge, skills, and abilities (KSAs) of current transportation professionals. Distance learning is an attractive means of enhancing KSAs because students are provided with the opportunity of anytime, anywhere learning. Additionally, the potential audience for distance learning courses is not limited to a specific region.

This research investigated the feasibility and sustainability of a distance learning program at the Texas Transportation Institute through the Center for Professional Development. Through a literature review and an on-line questionnaire completed by current transportation professionals, the research examined the market potential for a distance learning program, including those engineering topics that are in high demand within various transportation organizations. Some other issues that the research addressed included an individual's willingness to pay for courses, potential frequency of participation, and preferred course delivery medium. The results yielded a determination of the feasibility and sustainability of such a program and a prioritized list of topics that will provide direction in the initiation of a transportation-related distance learning program.

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